

Date Out EFB: APR 15 1982

To: Richard Mountfort
Product Manager 23
Registration Division (TS-767)

From: Dr. Willa Garner, Chief *lll*
Review Section No. 1
Environmental Fate Branch
Hazard Evaluation Division (TS-769)

Attached please find the environmental fate review of:

Reg./File No.: 707-145

Chemical: Oxyfluorfen (RH-915, 2-chloro-4-trifluoromethyl-3'-ethoxy-
4'-nitrodiphenylether)

Type Product: HerbicideProduct Name: GOAL® 2ECompany Name: Rohm & Haas

Submission Purpose: Field Monitoring Study & Applicator Exposure to PCE
and amendments

ZBB Code: otherACTION CODE: 575Date In: 2/16/82EFB # 193Date Completed: 4/13/82

TAIS (level II)

Days

67

4

Deferrals To:

67

4

☐ Ecological Effects Branch☐ Residue Chemistry Branch☒ Toxicology Branch

1.0 INTRODUCTION

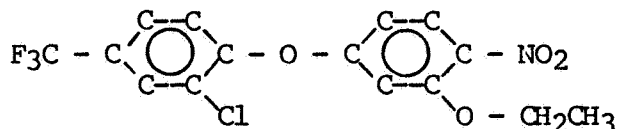
GOAL has been the subject of extensive RPAR review/evaluation, due to its inadvertant contamination with the solvent PCE (perchloroethylene). As part of the PD 1/2/3, the Agency estimated (worst case) the amount of PCE to which an applicator using GOAL could possibly be exposed. Based on these estimates the Agency required that, as a condition for continued registration for GOAL 2E, several studies be conducted by the registrant.

On February 10, 1982, Rohm and Haas submitted the following

- 1.1 ° Accession # 246780 - PCE Monitoring
 (loader/applicator exposure under actual use conditions)
- 1.2 ° Accession # 246781 - Environmental Exposure
 (Computer simulation of Goal movement in the environment
 utilizing an in-house and the EPA EXAMS model)
- 1.3 ° Accession # 246782 - Environmental Exposure
 (Field Monitoring of soil, hydrosol and water from several
 actual use areas)

The registrant requests that the Agency accept these studies as fulfillment of the Field Monitoring requirement for continued registration of GOAL®2E herbicide. In addition, the registrant requests the removal of label respirator requirements, based on the apparent low exposure demonstrated by these studies.

2.0 STRUCTURE



3.0 DIRECTIONS FOR USE

Sample labels are attached to this review.

4.0 REVIEW OF STUDIES

- 4.1 Zogorski, W.J. III. 1982. A Study to Measure Applicator Inhalation Exposure to PCE (Perchloroethylene/Tetrachloroethylene) During Commercial Field Application of Goal® 2E Herbicide. Spring House Research Laboratories, Rohm and Haas Company, Philadelphia, Pennsylvania. January 27, 1982. 135pp (TECHNICAL REPORT NUMBER TR36H-82-02) in... EPA Accession # 246780

Introduction

Exposure of applicators to PCE during normal application of GOAL®2E was evaluated at four different commercial orchards. Breathing-zone air was continuously sampled during each application, after which the collected PCE was quantitated. In addition, surface soil samples were collected at each site (0-1 inches) for oxyfluorfen analysis (to confirm application and rates).

Experimental

The four selected sites were as follows:

- a. Trial 1: Kline Ranch, Modesto, California, Peach Orchard, Hamford Sandy Loam Soil. (12/9/81)
- b. Trial 2: Cavaini & Sons Orchard, Ballico, California, Non-pariel Almond Orchard, Sandy Loam Soil. (12/9/81)
- c. Trial 3: Durrigo Bro. Vinyard, Lodi, California, Zinzendell grape (sic), Red Clay Loam Soil. (12/10/81)
- d. Trial 4: Robert Powell, Modesto, California, Nonpariel Almond Orchard, Sandy Loam Soil. (12/10/81)

All applications were made by ground equipment utilizing tee-jet nozzles, at an effective rate of 2 lb a.i./A (aqueous solutions).

Each mixer/applicator was fitted with Dupont air samplers with tubes drawing air from both sides of the breathing zone. Organic vapors were trapped with standard two-tiered activated charcoal sampling tubes. Monitoring was conducted at each site for about 45 minutes, to enable a total volume of about 25 liters to be collected. During the sampling period, normal commercial treatment methods were observed.

Sampling tubes were kept frozen in dry ice until analysis. Pumps were calibrated on-site using a bubble flow-meter. Field fortification standards were prepared by directly injecting known quantities of PCE into the upper portion of sampling tubes.

Soil samples (0-1") were collected with a small garden shovel, sealed in polythene bags, and stored on dry ice until analysis. Each sample tube (SKC-West Inc., #226-01 - 6 x 70 mm containing 150 mg Activated Charcoal) was opened, and the activated charcoal (upper and lower quantities) transferred to separate 10 ml screw cap vials, for separate analysis. PCE extraction consisted of pipetting 1 ml of pentane into each vial, 10 minutes of sonication, 20 minutes standing at room temperature, then injection into a GC/MS with single-ion monitoring at m/e 165 (PCE mass ion). Output was calibrated against a standard curve, prepared at the same

time. Results were corrected for desorption efficiency using the field fortification samples.

Soil samples were prepared for Oxyfluorfen analysis following thorough mixing by subsampling, blending with acetonitrile/water (70:30), vacuum filtration, and partitioning against petroleum ether in a separatory funnel. Quantification was by Method TR23-73-5, a copy of which may be found in the petition.

Results and Discussion

The GC/MS limit of detection for PCE was 0.001 ug/ml, which is equivalent to a monitoring detection limit of 0.002 ug/25 liters of air. Desorption efficiencies were found to vary from 86% to 40% as the fortification level decreased.

In none of the orchard tests was PCE detected, at the sensitivity of the method.

Residues of oxyfluorfen (three replicates, corrected for the average recovery of the method - 80%) averaged 11.50, 14.33, 7.67 and 12.27 ppm for fields 1 through 4, respectively.

Conclusion

If PCE were present, at or near the limit of detection, were inhaled for a full 8-hour work day, and totally retained (an extreme worst-case hypothetical), total exposure would have been 1.15 ug PCE¹

The EPA estimated work day exposure to PCE (PD 1/2/3) was 1480 ug/day. Thus, this study suggests actual field levels to be considerably lower, by a factor of almost 1300.

Recommendation

This study appears to have been carefully done, and the results and conclusions valid. We defer to Toxicology Branch on the toxicological significance of inhaling up to 1 ug PCE in any one work day, or 30 to 120 ug PCE over a 1-4 month growing season.

¹/ 0.00008 ug/l x 14,400 L air/8 hour work day (from PD 1/2/3)=
1.15 ug PCE

4.2 ° Accession # 246781 - Environmental Exposure

(This section will be reviewed by R. Holst of Review Section II)

- 4.3 Zogorski, W.J. III. 1982. A Study to Determine the Fate of Goal® Herbicide in the Environment. Agricultural Product Support. Rohm and Haas Company, Philadelphia, Pennsylvania. January 5, 1982. p 206 - 814. (TECHNICAL REPORT NUMBER 36H-82-1) in... EPA Accession # 246782

Introduction

This study was conducted to evaluate the distribution of oxyfluorfen in various environmental compartments (soil from treated field, runoff paths, hydrosol (edge and middle of pond), and pond water, resulting from the following applications:

| Farm Site | Application | |
|----------------------|-------------|----------------|
| | Year | History |
| 1. Wallace, NC | 1978 | - 3/4 lb ai/A |
| | 1979 | - 3/4 lb ai/A |
| | 1980 | - 3/4 lb ai/A |
| | 1981 | - 3/4 lb ai/A |
| | | 3.0 lb ai/A |
| 2. Wallace, NC | 1977 | - 1.5 lb ai/A |
| | 1978 | - 1.25 lb ai/A |
| | 1979 | - 1.0 lb ai/A |
| | 1980 | - 0.5 lb ai/A |
| | | 4.25 lb ai/A |
| 3. Oakville, IA | 1981 | - 0.38 lb ai/A |
| 4. Raeford, NC | 1981 | - 0.5 lb ai/A* |
| 5. Liddell, NC | 1981 | - 0.5 lb ai/A* |
| 6. Centralia, MO | 1981 | - 0.38 lb ai/A |
| ----- | | |
| */ first use of GOAL | | |

Climatic conditions are summarized in detail in appendix IV of the report.

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Experimental

Samples were collected as follows:

- a. Field- and runoff-path soil was sampled with a mason's trowel, by scraping about 0.5 to 1.0 lb of the upper 1".
- b. Edge-of-Pond sediment was sampled with the mason's trowel, with excessive moisture allowed to drain before storage in a PE bag.
- c. Middle-of-Pond sediment was sampled with a section of PVC pipe, modified to form a dredge.
- d. Pond water was collected directly into a 1000 ml PE bottle.

All samples were kept "cool" on wet ice until shipment to the lab, then stored at -15°C until analysis.

Water samples were subsampled, filtered, mixed with NaCl and extracted with petroleum ether. Soil samples were blended, subsampled, blended with acetonitrile/water, and filtered under vacuum. The filtrate was processed as a water sample.

Analysis was by method TR-23-73-5 (with only minor modification) involving EC/GC quantification (10% OV-1 on gaschrom Q - silanized and a Ni⁶³ detector). Extraction efficiencies were reported to have averaged >90%. A copy of the method may be found with the study.

Results and Discussion

Copies of the summary tables (I-VI) are appended to this review. As expected, the highest residue levels were detected in the initial samples, declining over several months. At the end of each sampling period oxyfluorfen was at or near the limit of detection (.01 ppm) in virtually all samples.

Conclusions

We are concerned about the sampling methodology used in this study. Specifically, there did not seem to be any statistically based scheme for sample site selection. Rather, samples were apparently taken wherever and whenever convenient. With reference to the data in Table II, for example, the first line entry shows edge of field soil sample residues varying from 0.28 to 0.03 to 0.04 to 0.26, over a period of 4 months. The data in Table III (lines 1,2 and 4), Table IV (line 3), Table 5 (lines 2 and 3) and Table VI (lines 1,2 and 3) show similar inconsistencies.

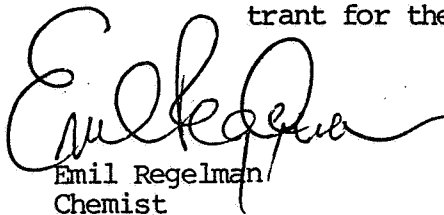
When the data are evaluated statistically, the results (examples appended to this review) show wide variation, confirming the apparently non-random and limited sampling done at each site.

Other problems with this review include unclear superscript references (Tables II, III, IV, V and VI), unspecified statistical computational methodology, inadequate limits of detection for water samples, as well as failure to analyze for degradates or metabolites. Also, it is unclear whether this chemical is RH-915 (pg 229) or RH-2915, as in earlier reviews.

Recommendation

Despite the rather voluminous size of this submission (which included many chromatograms and mass spectrograms), the study is wholly inadequate. It is therefore unacceptable, and should be redone.

NOTE to PM: A copy of the field monitoring sections of the current Guidelines should be forwarded to the registrant for their reference.



Emil Regelman
Chemist
EFB/HED (TS-769)
April 13, 1982

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: EMIL REGELMAN

DATE: APRIL 12, 1982

TITLE: GOAL RESIDUE DISTRIBUTION - FIELD P-18

REMARKS: FIELD MONITORING DATA - TABLE I

| | | |
|-----------------|-----------------------|-------------------|
| FILE NAME: GOAL | RESIDUE LEVELS IN PPM | INTERVALS IN DAYS |
|-----------------|-----------------------|-------------------|

DATA ENTRIES 1 TO 4

| | | | |
|---------------|----------------|---------------|-----------------|
| .02 at 0 DAYS | .14 at 73 DAYS | .1 at 95 DAYS | .03 at 130 DAYS |
|---------------|----------------|---------------|-----------------|

N= 4 SUM X= 298 SUM X²= 31254 SUM Y=-11.6873 SUM Y²= 36.7674 SUM X*Y=-818.124

For the 95% confidence level, the appropriate 't' VALUE=2.9128 (For a one tailed test)

DF=2 R SQUARED=.116583 CHI SQUARED=.81582 % Probability of a good fit=36.6%
Y-INTERCEPT=-3.3545 RELATIVE % ERROR OF THE SLOPE= 194.6% % LOSS PER DAY=-.58%

SLOPE= .006, its UPPER 95% CL= .039 and its LOWER 95% CL= -.027
HALF LIFE=-119.3 DAYS, its UPPER 95% CL=-17.9 DAYS and its LOWER 95% CL= 25.6 DAYS

DAY ZERO LEVEL=.035 PPM, its UPPER 95% CL=2.514 PPM and its LOWER 95% CL=0 PPM

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REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: EMIL REGELMAN

DATE: APRIL 12, 1982

TITLE: GOAL RESIDUE DISTRIBUTION - FIELD D-213

REMARKS: FIELD MONITORING DATA - TABLE II

| FILE NAME: | RESIDUE LEVELS IN PPM | INTERVALS IN DAYS |
|---------------------|-----------------------|-------------------|
| DATA ENTRIES 1 TO 4 | | |
| .28 at 0 DAYS | .03 at 73 DAYS | .04 at 95 DAYS |
| | | .26 at 130 DAYS |

N= 4 SUM X= 298 SUM X+2= 31254 SUM Y=-9.34548 SUM Y+2= 26.0922 SUM X*Y=-736.892
For the 95% confidence level, the appropriate 't' VALUE=2.9128 (For a one tailed test)

DF=2 R SQUARED=.0428782 CHI SQUARED=1.71051 % Probability of a good fit=19.1%
Y-INTERCEPT=-2.00182 RELATIVE % ERROR OF THE SLOPE= 334.1% % LOSS PER DAY= .45%

SLOPE= -.004, its UPPER 95% CL= .039 and its LOWER 95% CL= -.048
HALF LIFE= 154.4 DAYS, its UPPER 95% CL=-17.7 DAYS and its LOWER 95% CL= 14.4 DAYS

DAY ZERO LEVEL=.135 PPM, its UPPER 95% CL=39.385 PPM and its LOWER 95% CL=0 PPM

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: EMIL REGELMAN

DATE: APRIL 12, 1982

TITLE: GOAL RESIDUE DISTRIBUTION - FIELD 218127

REMARKS: FIELD MONITORING DATA - TABLE III

| FILE NAME: | RESIDUE LEVELS IN PPM | INTERVALS IN DAYS |
|------------|-----------------------|-------------------|
|------------|-----------------------|-------------------|

DATA ENTRIES 1 TO 5

| | | |
|----------------|----------------|-----------------|
| .91 at 0 DAYS | .15 at 57 DAYS | .07 at 115 DAYS |
| .11 at 26 DAYS | .11 at 99 DAYS | |

N= 5 SUM X= 297 SUM X²= 26951 SUM Y=-9.06524 SUM Y²= 20.4237 SUM X*Y=-689.86
 For the 95% confidence level, the appropriate 't' VALUE=2.3465 (For a one tailed test)

DF=3 R SQUARED=.617296 CHI SQUARED=1.39605 % Probability of a good fit=49.8%
 Y-INTERCEPT=-.847094 RELATIVE % ERROR OF THE SLOPE= 45.5% % LOSS PER DAY= 1.61%

SLOPE= -.016, its UPPER 95% CL= .001 and its LOWER 95% CL= -.034
 HALF LIFE= 42.6 DAYS, its UPPER 95% CL=639 DAYS and its LOWER 95% CL= 20.6 DAYS

DAY ZERO LEVEL=.429 PPM, its UPPER 95% CL=3.511 PPM and its LOWER 95% CL=.052 PPM

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: EMIL REGELMAN

DATE: APRIL 12, 1982

TITLE: GOAL RESIDUE DISTRIBUTION - FIELD H79-289

REMARKS: FIELD MONITORING DATA - TABLE IV

FILE NAME: GOAL

RESIDUE LEVELS IN PPM

INTERVALS IN DAYS

DATA ENTRIES 1 TO 3

.26 at 0 DAYS

.18 at 21 DAYS

.05 at 56 DAYS

N= 3 SUM X= 77 SUM X²= 3577 SUM Y=-6.05761 SUM Y²= 13.7296 SUM X*Y=-203.772
For the 95% confidence level, the appropriate 't' VALUE=6.3034 (For a one tailed test)

DF=1 R SQUARED=.972641

Y-INTERCEPT=-1.24482 RELATIVE % ERROR OF THE SLOPE= 16.8% % LOSS PER DAY= 2.97%

SLOPE= -.03, its UPPER 95% CL= .002 and its LOWER 95% CL= -.062

HALF LIFE= 23 DAYS, its UPPER 95% CL=-401.7 DAYS and its LOWER 95% CL= 11.2 DAYS

DAY ZERO LEVEL=.288 PPM, its UPPER 95% CL=1.554 PPM and its LOWER 95% CL=.053 PPM

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REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: EMIL REGELMAN

DATE: APRIL 12, 1982

TITLE: GOAL RESIDUE DISTRIBUTION - FIELD L-75

REMARKS: FIELD MONITORING DATA - TABLE V

| FILE NAME: | RESIDUE LEVELS IN PPM | INTERVALS IN DAYS |
|------------|-----------------------|-------------------|
|------------|-----------------------|-------------------|

DATA ENTRIES 1 TO 3

| | | |
|--------------|----------------|---------------|
| .3 at 0 DAYS | .16 at 23 DAYS | .1 at 57 DAYS |
|--------------|----------------|---------------|

N= 3 SUM X= 80 SUM X²= 3778 SUM Y=-5.33914 SUM Y²= 10.1098 SUM X*Y=-173.397
For the 95% confidence level, the appropriate 't' VALUE=6.3034 (For a one tailed test)

DF=1 R SQUARED=.962787

Y-INTERCEPT=-1.27676 RELATIVE % ERROR OF THE SLOPE= 19.7% % LOSS PER DAY= 1.87%

SLOPE= -.019, its UPPER 95% CL= .005 and its LOWER 95% CL= -.042

HALF LIFE= 36.8 DAYS, its UPPER 95% CL=-153.6 DAYS and its LOWER 95% CL= 16.4 DAYS

DAY ZERO LEVEL=.279 PPM, its UPPER 95% CL=.983 PPM and its LOWER 95% CL=.079 PPM

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: EMIL REGELMAN

DATE: APRIL 12, 1982

TITLE: GOAL RESIDUE DISTRIBUTION - FIELD 608113

REMARKS: FIELD MONITORING DATA - TABLE VI

FILE NAME: RESIDUE LEVELS IN PPM INTERVALS IN DAYS

DATA ENTRIES 1 TO 5

| | | |
|---------------|----------------|-----------------|
| .16 at 0 DAYS | .18 at 24 DAYS | .08 at 101 DAYS |
| .42 at 3 DAYS | .08 at 64 DAYS | |

N= 5 SUM X= 192 SUM X²= 14882 SUM Y=-9.46634 SUM Y²= 19.8101 SUM X*Y=-460.503
For the 95% confidence level, the appropriate 't' VALUE=2.3465 (For a one tailed test)

DF=3 R SQUARED=.663692 CHI SQUARED=.413165 % Probability of a good fit=81.3%
Y-INTERCEPT=-1.39726 RELATIVE % ERROR OF THE SLOPE= 41.1% % LOSS PER DAY= 1.28%

SLOPE= -.013, its UPPER 95% CL= 0 and its LOWER 95% CL= -.025
HALF LIFE= 53.7 DAYS, its UPPER 95% CL= 1506.3 DAYS and its LOWER 95% CL= 27.3 DAYS

DAY ZERO LEVEL=.247 PPM, its UPPER 95% CL=.885 PPM and its LOWER 95% CL=.069 PPM

RIN 0637-00

EFED Review - Oxyfluorfen

Page is not included in this copy.

Pages 14 through 19 are not included.

The material not included contains the following type of information:

- ☐ Identity of product inert ingredients.
- ☐ Identity of product impurities.
- ☐ Description of the product manufacturing process.
- ☐ Description of quality control procedures.
- ☐ Identity of the source of product ingredients.
- ☐ Sales or other commercial/financial information.
- ☐ A draft product label.
- ☐ The product confidential statement of formula.
- ☐ Information about a pending registration action.
- ☒ FIFRA registration data.
- ☐ The document is a duplicate of page(s) .
- ☐ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

ACCEPTED
MAY 18 1981
Under the Federal Insecticide,
Fungicide, and Rodenticide
Act, as amended, the pesticide
registered under 707-145
EPA Reg. No.

GOAL 2E HERBICIDE



STORAGE AND DISPOSAL
PROHIBITIONS: Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited for storage or empty container.
PESTICIDE DISPOSAL: Pesticide, spray mixture or empty container should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies.
CONTAINER DISPOSAL: Triple rinse (or equivalent) and dispose in an incinerator or landfill approved for pesticide containers or bury in a safe place.
GENERAL: Consult Federal, State or local disposal authorities for approved alternative procedures such as limited open burning.

WARNING
KEEP OUT OF REACH OF CHILDREN
Before using this product, read all additional precautionary statements, storage and disposal instructions, use restrictions, and limit of warranty and liability statements on side and back panels.

ACTIVE INGREDIENT:
Oxyfluorfen
2-chloro-1-(3-ethoxy-4-nitrophenoxy)-
4-(trifluoromethyl) benzene 22.6%
INERT INGREDIENTS 77.4%
100.0%
*Equivalent to 2 lbs. active ingredient per gallon.
EPA Reg. No. 707-145-AA
EPA Est. No. 707-PA-1
U.S. Pat. No. 3,798,276

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

WARNING

Causes eye and skin irritation. Do not get in eyes, on skin, or on clothing. In case of eye contact immediately flush eyes with large amounts of water for at least 15 minutes. Call a physician. In case of skin contact remove contaminated clothing and wash skin immediately with soap and water.
This material may be harmful if swallowed. Do not induce vomiting. Call a physician. Do not induce vomiting or give anything by mouth to an unconscious person.

Environmental Hazards

Keep out of lakes, ponds or streams. Do not contaminate water by cleaning of equipment or disposal of wastes.

This pesticide is toxic to wildlife and fish. Use with care when applying in areas frequented by wildlife or adjacent to any body of water. Do not apply when weather conditions favor drift from target areas. Do not contaminate water by cleaning of equipment or disposal of wastes.

Physical or Chemical Hazards

Combustible

Keep away from heat and open flame.

KEEP FROM FREEZING:

STORE ABOVE 32°F.

Place use instructions:

DIRECTIO

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

SEE ATTACHED BOOKLET

SHAKE WELL

GOAL is a trademark

NET CONTENTS 1

NOTICE: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purpose stated on the label when used in accordance with directions under normal conditions of use, but neither this warranty nor any other warranty of merchantability or fitness for a particular purpose, expressed or implied, extends to the storage or handling of the product in a manner other than as directed by label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use. These risks include, but are not limited to, damage to plants, crops and animals to which material is applied, failure to control pests, damage caused by drift to other plants or crops, and personal injury.

MADE IN U.S.A.

NO-TILL (DOUBLE CROP) — RECOMMENDED DOSAGES PREEMERGENCE

Fields known to have troublesome perennial weeds such as johnson-grass or bermudagrass should not be selected for planting in no-tillage soybeans. In fields employing these systems, where GOAL is recommended as part of the system, it should be tank-mixed with paraquat herbicide. Use 1 quart of GOAL product (0.5 lb. active) plus 1 pint of paraquat CI (0.25 lb. active) per acre in 20 to 60 gallons of water. The use of this mixture will give postemergence control of emerged annual broadleaves up to 6 inches tall and preemergence control of redroot pigweed, jimsonweed, common lambsquarters, Pennsylvania smartweed and velvetleaf.

Use the GOAL 2E/LASSO 4E/paraquat tank mix for control of emerged annual broadleaves and grasses up to six inches tall and for improved preemergent control of the following weeds over use of the GOAL/paraquat tank mix: redroot pigweed, common lambsquarters and fall panicum. Use a tank-mixture of the 3 components as follows: GOAL 2E, 2.0 pints (0.50 lb. active); paraquat CI 1.0 pint (0.25 lb. active); plus LASSO 4E, 2 quarts (2.0 lb. active) should be applied in 20 to 60 gallons of water per acre as a preemergence treatment. The order of mixing or adding GOAL/paraquat/LASSO 4E to the spray tank is not important; however, the herbicides should be added to a spray tank partially filled with water, with the agitators or bypass system in operation. Maintain agitation throughout the spraying operation. Use 50 mesh screens or larger in spray nozzles.

TRITON® AG-98 is suggested in all tank mixtures containing paraquat herbicide. Follow the paraquat label directions for the proper use rate of the nonionic surfactant.

POST-DIRECTED SPRAY: GOAL can be used successfully in a post-directed application for control of common cocklebur, prickly sida and tall (annual) morningglory in soybeans. Weeds to be treated must be emerging and young, not exceeding 4 inches in height. Do not treat if soybeans are below 8 inches tall. Soybean foliage receiving accidental spray or drift will be injured.

For best coverage use 4 flat fan nozzles per row, 2 nozzles on each side of row. The two forward nozzles should point forward and downward while the rear nozzles should point to the rear and also be directed downward. Nozzles so adjusted should cover the weed foliage with a minimum of contact to the soybean plant. The use of shields is recommended to avoid spray contact with soybean foliage. The suggested application rate is 1 pint of GOAL (0.25 lb. active) per acre broadcast in a minimum of 25 gallons of water.

LASSO® is a registered trademark of Monsanto Company.
TREFLAN® is a registered trademark of Eanco Products Co.
GOAL® and TRITON® are registered trademarks of Rohm and Haas Company.

USE RESTRICTIONS

Do Not Apply more than one application of GOAL 2E to Soybeans.

Do Not Rotate with crops other than Soybeans for 10 months following a GOAL herbicide application. In the event of crop failure, do not plow field under. Field may be replanted to Soybeans without tillage.

Do Not Apply a Post-Directed Application of GOAL to Soybeans after the initial appearance of blooms.

Do Not Apply GOAL 2E when weather conditions favor drift.

Do Not Use Treated Plants for Feed or Forage.

STORAGE AND DISPOSAL

PROHIBITIONS: Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited. Do not reuse empty container.

PESTICIDE DISPOSAL: Pesticide, spray mixture or rinsate that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies.

CONTAINER DISPOSAL: Triple rinse (or equivalent) and dispose in an incinerator or landfill approved for pesticide containers or bury in a safe place.

GENERAL: Consult Federal, State or local disposal authorities for approved alternative procedures such as limited open burning.

NOTICE: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purpose stated on the label when used in accordance with directions under normal conditions of use, but neither this warranty nor any other warranty of merchantability or fitness for a particular purpose, express or implied, extends to the use, storage or handling of this product in a manner other than as directed by label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use. These risks include, but are not limited to damage to plants, crops and animals to which the material is applied, failure to control pests, damage caused by drift to other plants or crops, and personal injury.

MADE IN U.S.A.

8727-S1a

GOAL® 2E Herbicide (EPA Reg. No. 707-145) SUPPLEMENTAL LABEL INSTRUCTIONS FOR SOYBEANS

Environmental Hazards:

This product is highly toxic to freshwater clams, oysters, aquatic invertebrates and aquatic plants. Do not apply GOAL where visible erosion to aquatic habitats and/or wetlands occurs. (See container for further information on Environmental Hazards.)

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ROHM AND HAAS COMPANY
PHILADELPHIA, PA. 19105

EPA REG. NO. 707-145-AA
EPA EST. NO. 707-PA-1

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ROHM AND HAAS COMPANY
PHILADELPHIA, PA. 19105

EPA REG. NO. 707-145-AA
EPA EST. NO. 707-PA-1

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GOAL® 2E HERBICIDE

USE DIRECTIONS FOR: WEED CONTROL IN SOYBEANS

Before using this product, read all precautionary statements, storage and disposal instructions, and limit of warranty and liability statements on container label.

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

GENERAL INFORMATION

GOAL 2E is a selective herbicide for the preemergence control of certain annual grass and broadleaf weeds in soybeans in a preemergence application. A preemergence application should be made on the soil surface no later than one day after planting the soybeans. GOAL kills seedling weeds as they come in contact with the herbicide during emergence. For use directions covering post-directed sprays in soybeans, see information at end of label.

IMPORTANT: Soybeans are tolerant to recommended dosages of GOAL; however, under certain conditions, GOAL can cause temporary injury. Heavy splashing rain shortly after crop emergence or cold, wet soil conditions during early growth stages can produce leaf cupping and crinkling. When injury occurs, it is generally limited to the first few leaves that develop shortly after crop plants emerge from the soil. Soybeans recover from this injury and yields are not adversely affected.

APPLICATION, MIXING, AND EQUIPMENT: Apply GOAL on the soil surface no later than one day after soybean planting. For best results, a uniform application should be made to a well prepared, smooth seedbed free of large soil clods. GOAL should be thoroughly mixed with clean water at recommended concentration and applied in a minimum of 20 gallons of water per treated acre. Use conventional spray equipment with fan-type or flood jet nozzles. Accurately calibrate spray equipment prior to each use. Avoid drift to all other crops and non-target areas. Thoroughly flush spray tanks with water before and after each use.

WEEDS CONTROLLED: GOAL 2E used alone at recommended dosages.

Cutleaf Groundcherry
Jimsonweed
Common Lambsquarters
Redroot Pigweed
Prickly Sida (Teaweed)
Common Ragweed
Pennsylvania Smartweed
Velvetleaf
Black Nightshade
Barnyardgrass
Large Crabgrass
Fall Panicum
Giant Foxtail

Physalis angulata
Datura stramonium
Chenopodium album
Amaranthus retroflexus
Sida spinosa
Ambrosia artemisiifolia
Polygonum pennsylvanicum
Abutilon theophrasti
Solanum nigrum
Echinochloa crus-galli
Digitaria sanguinalis
Panicum dichotomiflorum
Setaria faberi

Under certain conditions, GOAL may give sufficient benefit (suppression) to be of value against the following weeds:

Common Cocklebur
Morningglory species
Seedling Johnsongrass
Broadleaf Signalgrass
Yellow Foxtail

Xanthium pensylvanicum
Ipomoea spp.
Sorghum halepense
Brachiaria platyphylla
Setaria lutescens

WEEDS CONTROLLED: GOAL preemergence to soybeans following a TREFLAN® preplant incorporated treatment.

When TREFLAN is used preplant incorporated and followed by GOAL in a preemergence application, in addition to the broadleaves controlled, increased grassy weed control, over the use of GOAL alone, is obtained for the following:

Barnyardgrass
Large Crabgrass
Giant Foxtail
Yellow Foxtail

Echinochloa crus-galli
Digitaria sanguinalis
Setaria faberi
Setaria lutescens

GOAL® 2E HERBICIDE

USE DIRECTIONS FOR: WEED CONTROL IN SOYBEANS

WEEDS CONTROLLED: Tank mixture GOAL 2E + LASSO® 4E. The use of GOAL preemergence in a tank mixture with LASSO herbicide gives broadleaf control plus improved grassy weed control over GOAL alone on the following:

Barnyardgrass
Large Crabgrass
Fall Panicum
Yellow Foxtail
Seedling Johnsongrass
Broadleaf Signalgrass

Echinochloa crus-galli
Digitaria sanguinalis
Panicum dichotomiflorum
Setaria lutescens
Sorghum halepense
Brachiaria platyphylla

CONVENTIONALLY TILLED SOYBEANS — RECOMMENDED DOSAGES

PREEMERGENCE

GOAL is recommended for preemergence broadcast or banded applications to conventionally planted soybeans. GOAL is recommended for broadleaf and grass control at 1.0 to 1.5 pints (0.25 to 0.375 lb. active) per acre. Use the high rate where a heavy grass population is expected or where weeds claimed as suppressed are present. GOAL is not recommended for use on muck or peat soils. GOAL can be used alone in a preemergence application where grassy weeds are not a serious problem or preemergence over a TREFLAN preplant incorporated treatment, or as a tank mixture in a preemergence application with LASSO 4E herbicide. See charts below for dosage rates.

GOAL PREEMERGENCE TO SOYBEANS FOLLOWING A TREFLAN PREPLANT INCORPORATED TREATMENT

| BROADCAST RATE PER ACRE | GOAL FOLLOWING TREFLAN | | | |
|----------------------------|---|------------|------|-----------|
| | TREFLAN Rate in Pints Soil Organic Content | | | |
| | GOAL 2E pints* | 0-1.9% | 2-5% | 5-10% |
| Coarse | 1.0-1.5 | 1.0 | 1.5 | 2.0-2.5** |
| Medium | 1.0-1.5 | 1.5 | 1.5 | 2.0-2.5 |
| Fine | 1.0-1.5 | 2.0 | 2.0 | 2.0-2.5 |
| Muck or Peat | | Do not use | | |

Label cautions for TREFLAN use should be strictly followed.

*Use highest rate where heavy grass infestation is expected.

**Refer to TREFLAN manufacturer's label for specific details such as planting depth, gallonage of water, incorporation information and control of problem weeds such as fall panicum, rhizome johnsongrass and wild cane.

GOAL/LASSO PREEMERGENCE TO SOYBEANS

| BROADCAST RATE PER ACRE | GOAL 2E TANK-MIX WITH LASSO 4E | | |
|----------------------------|------------------------------------|---|---|
| | 0 to 8% Soil Organic Content | Less than 3% Soil Organic Content | More than 3% Soil Organic Content |
| Soil Texture | GOAL 2E pints | LASSO 4E pints | LASSO 4E pints |
| Coarse | 1.0-1.5 | 3.0 | 3.0 |
| Medium | 1.0-1.5 | 3.0 | 4.0 |
| Fine | 1.0-1.5 | 4.0 | 5.0 |
| Muck or Peat | | Do not use | |

Label cautions for LASSO use should be strictly followed.

(over)

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Series 164: DISSIPATION STUDIES

§ 164-1 Field dissipation studies for terrestrial uses.

(a) Purpose. The purpose of field dissipation studies for pesticides with terrestrial uses is to determine the extent of pesticide residue dissipation under actual use conditions. These studies will generate data required for the on-site evaluation of mobility, degradation, and dissipation of residues. These studies are also required because pesticide dissipation may proceed at a different rate under field conditions and therefore result in the formation of degradates differing from those observed in laboratory studies.

(b) When required. Data from a terrestrial field dissipation study must be submitted by each applicant for registration of an end-use product intended for any terrestrial use (except greenhouse use), and by each applicant for registration of a manufacturing-use product which legally could be used to make such an end-use product.

(c) Test standards. Data sufficient to satisfy the requirements of paragraph (b) of this section must be derived from testing which complies with the general test standards in § 160-4 and all of the following test standards:

(1) Test substance. The test substance shall be a typical end-use product.

(i) If an applicant's product is an end-use product, the test substance shall be a product whose formulation is typical of the formulation category (e.g., wettable powder, emulsifiable concentrate, granular product) to which the product belongs.

(ii) If the applicant's product is a manufacturing-use product that legally could be used to make an end-use product for which terrestrial field dissipation data are required, the test substance shall be a product representative of the major formulation category which includes that end-use product. (If the manufacturing-use product is usually formulated into end-use products comprising two or more major formulation categories, a separate study must be performed with a typical end-use product for each such category.)

(2) Test procedures. (i) Sites. Field dissipation studies must be conducted in at least two different sites which are representative of the areas where the pesticide is expected to be used. For restricted use patterns where only one typical area is involved, data from two similar sites are required. Studies at additional locations may be required if the product is intended for a terrestrial crop use, and the sites of application vary appreciably in climate, terrain, or other pertinent characteristics.

(ii) Application. The test substance shall be applied using the method of application stated in the directions for use specified on the product label and at the highest rate recommended on the product label.

(iii) Soil sampling. Soil from the treated area shall be sampled following treatment for the purpose of ascertaining the extent of pesticide dissipation.

(A) Soil samples serving as test controls shall be obtained from the intended application sites immediately prior to application of the test substance and, to the extent possible, from adjacent untreated areas at intervals during the course of the study and at the termination of the study.

(B) Sampling times shall include pre-application (control), date of application, and immediate post-application for each single or multiple application of the test substance.

(C) Soil samples shall be taken in increments, to a maximum depth of 15 cm, provided that the results of studies on pesticide leaching indicate that the test substance is not likely to leach into soil to a depth greater than 15 cm; and

(D) If data on leaching indicate that the test substance is likely to leach into soil to a depth greater than 15 cm, or if the pesticide is incorporated into soil, then samples shall be taken to a depth sufficient to define the extent of leaching.

(iv) Test duration. Residue data shall be collected until patterns of decline of the test substance and patterns of formation and decline of degradation products are established in soil, or to the time periods specified below, whichever comes first:

(A) Field and vegetable crop uses: 18 months;

(B) Orchard crop and pastureland uses: 12 months;

(C) Domestic outdoor, park, ornamental, and turf uses: four months; and

(D) Rights-of-way, shelter belts, and related uses: two months.

(d) Reporting and evaluation of data. In addition to the basic reporting requirements specified in § 160-5, the test report shall include the following specific information:

(1) Decline curves of residues in each major substrate analyzed; and

(2) Field test data, including:

(i) Amount of rainfall and irrigation water (accumulated from first application to each sampling);

(ii) Water table;

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- (iii) Grade (slope);
- (iv) Soil and air temperature data;
- (v) Techniques and times of planting and harvesting;
- (vi) Application time and method;
- (vii) Sampling times and techniques;
- (viii) Dates and stages of crop and pest development;
- (ix) Application-to-harvest (if applicable) and application-to-sampling intervals for each treatment; and
- (x) Depth, weight, or volume of each sample taken for analysis.

(e) References. (1) The following references contain information that could be useful for development of a protocol for conducting field dissipation studies:

(i) Caro, J.H., H.P. Freeman, and B.C. Turner. 1974. Persistence in soil and losses in runoff of soil-incorporated carbaryl in a small watershed. J. Agr. Food Chem. 22:860-863. [This is a well-planned and well-executed field dissipation study.]

(ii) Miller, C.H., T.J. Monaco, and T.J. Sheets. 1976. Studies on nitralin residues in soils. Weed Sci. 24:288-291. [The experimental design and sampling procedures in this paper are well devised.]

(iii) Polzin, W.J., I.F. Brown, Jr., J.A. Manthey, and G.W. Probst. 1971. Soil persistence of fungicides - Experimental design, sampling, chemical analysis, and statistical evaluation. Pest. Monit. J. 4:209-215. [The factors causing variability in field dissipation studies are considered and analyzed in this paper. However, this study is more detailed than required for pesticide registration.]

(iv) Smith, A.E., and A. Walker. 1977. A quantitative study of asulam persistence in soil. Pestic. Sci. 8:449-456. [The experimental design and statistical analyses of data in this paper are described in detail for field dissipation studies.]

(2) The following reference contains supplemental information for developing a protocol for field dissipation studies:

(i) Goring, C.A.I., D.A. Laskowski, J.W. Hamaker, and R.W. Meikle. Principles of Pesticide Degradation in Soil. Pp. 135-172 in Environmental Dynamics of Pesticides. R. Haque and V.H. Freed (eds.). Plenum Press. New York. [This is an excellent review for analyses of data and for an understanding of factors affecting persistence of pesticides in soil.]

(ii) (Reserved.)

year?

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§ 164-2 Field dissipation studies for aquatic uses and aquatic impact uses.

(a) Purpose. The purpose of field dissipation studies for pesticides with aquatic uses is to determine the extent of dissipation and mobility of pesticide residues under actual use conditions. These dissipation studies will generate on-site data for evaluating potential hazards of a pesticide under actual use conditions (e.g., mobility, formation of metabolites, and disappearance of parent compound) and provide information with respect to mechanisms of dissipation in various aquatic environments. An aquatic field dissipation study is also required because pesticide dissipation may proceed at a different rate in the aquatic environment than in laboratory aquatic studies.

(b) When required. (1) Except as provided in § 164-2(b)(2), data from an aquatic field dissipation study must be submitted by each applicant for registration of an end-use product intended for aquatic food crop uses, for aquatic non-crop uses (which include antifouling paints and other outdoor protective uses where the pesticide-containing surface is in contact with water, and also pesticide application to ditchbanks and shorelines), and for any aquatic impact uses involving direct discharges of treated water into outdoor aquatic sites. Data from such a study must also be submitted by each applicant for registration of a manufacturing-use product which legally could be used to make such an end-use product.

(2) Pesticides intended for use as antifouling paints and for similar related protective aquatic uses are exempt from the data requirements of this section if the following conditions are met:

(i) The octanol/water partition coefficient of the product is approximately 1000 or less; and

(ii) The half-life of the active ingredient in water is less than four days as demonstrated in the hydrolysis studies, § 161-1.

(c) Combined testing. Testing conducted to meet the requirements of this section may be combined with the testing conducted to meet the requirements of § 165-4 (field accumulation studies in aquatic nontarget organisms), provided that the test standards for each study are met.

(d) Test standards. Data sufficient to satisfy the requirements of paragraph (b) of this section must be derived from testing which complies with the general test standards in § 160-4, and all of the following test standards:

(1) Test substance. The test substance shall be a typical end-use product.

(i) If the applicant's product is an end-use product, the test substance shall be a product whose formulation is typical of the formulation category (e.g., wettable powder, emulsifiable concentrate, granular product) to which the product belongs.

(ii) If the applicant's product is a manufacturing-use product that legally could be used to make an end-use product for which aquatic field

dissipation data are required, the test substance shall be a product representative of the major formulation category which includes that end-use product. [Except for antifouling paints and other related protective-use products (which fall into one formulation category), if the manufacturing-use product is usually formulated into end-use products comprising two or more major formulation categories, a separate study must be performed with a typical end-use product for each such category.]

(2) Test sites. Aquatic field dissipation studies must be conducted in at least two different sites which are representative of the areas where the pesticide is expected to be discharged or applied. For restricted use patterns where only one typical area is involved, data from two similar sites are required. Studies in additional locations may be required if the pesticide is intended for an aquatic food crop use, and the sites of application vary in climate, terrain, or other pertinent characteristics.

(3) Application. The test substance shall be applied using the method of application stated in the directions for use specified on the product label and at the highest rate recommended on the product label. If the products are for use in pulp and paper mills or industrial cooling towers where direct discharge of pesticide-treated water would be expected, sufficient test substance shall be applied to the receiving water in the study to produce the maximum concentration expected for each discharge event.

(4) Sampling. Soil, sediment, and water samples serving as test controls shall be obtained from the intended sites of application or from direct aquatic discharges immediately prior to application or discharge of the test substance, and to the extent possible from the adjacent untreated areas, at intervals during the course of the study, and at the termination of the study. Soil, sediment, and water from the treated area shall be sampled following treatment for the purpose of ascertaining the extent of pesticide dissipation in accordance with the following:

(i) Sampling times shall include pre-application (control), date of application, and immediate post-application for each single or multiple application of the test substance.

(ii) For aquatic food crop uses, soil and water shall be sampled.

(iii) For aquatic non-crop uses, soil sediment and water shall be sampled.

(iv) For aquatic impact uses resulting in direct discharges, sediment and water shall be sampled.

(v) Soil shall be sampled in increments to a depth of 15 cm.

(vi) Sediment shall be sampled in increments to a depth of 5 cm.

(vii) Water shall be sampled to a depth dependent upon the use patterns of the pesticide and the site of pesticide action in water (bottom, surface, etc.), and flow meters or comparable techniques shall be used to measure water flow.

(5) Test duration. Residue data shall be collected until patterns of decline of the test substance and patterns of formation and decline of degradation products are established in the media samples, or to the maximum time specified below for all use patterns in representative areas, whichever comes first.

(i) Aquatic food crop uses: maximum test duration shall be 12 months after application for soil sampling and one month after application for water sampling.

(ii) Aquatic non-crop uses (all use patterns):

(A) Maximum test duration for sediment sampling shall be six months for a single application, and for multiple applications, the longer of the following: nine months after the first application, or six months after the last application.

(B) Maximum test duration for water sampling shall be one month following each discharge event.

(iii) Aquatic non-crop uses (products intended for application to ditchbanks and shorelines only): the maximum test duration for soil sampling shall be six months for a single application, and for multiple applications, the longer of the following: nine months after the first application or six months after the last application.

(iv) Aquatic impact uses resulting in direct discharges:

(A) The maximum test duration for sediment sampling shall be six months following a single discharge event, and following multiple discharge events, the longer of the following: nine months after the first discharge or six months after the last discharge.

(B) The maximum test duration for water sampling shall be one month following each discharge event.

(e) Reporting and evaluation of data. In addition to the basic reporting requirements specified in § 160-5, the test report shall include the following specific information:

(1) Decline curves of residues in each major substrate analyzed; and

(2) Field test data, including:

(i) Dates of planting and harvesting of crops, if applicable;

(ii) Application time(s) and method;

(iii) Sampling times and techniques;

(iv) Dates and stages of crop and pest development, if applicable;

(v) Application-to-harvest (if applicable) and application-to-sampling intervals for each treatment;

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(vi) Depth, weight, or volume of each sample, and weights and volumes of aliquots taken for analysis; and

(vii) Flow data expressed in terms of volume or linear flow.

(f) References. (1) The following references contain supplemental information for developing a protocol for conducting aquatic crop studies:

(i) Demint, R.J., J.C. Pringle, Jr., A. Hattrup, V.F. Bruns, and P.A. Frank. 1975. Residues in crops irrigated with water containing trichloroacetic acid. J. Agr. Food Chem. 23:81-84. [This paper presents a procedure for assessment of pesticide carryover in irrigation water.]

(ii) Rice, C.P., H.C. Sikka, and R.S. Lynch. 1974. Persistence of dichlobenil in a farm pond. J. Agr. Food Chem. 22:533-534. [This paper presents procedures for assessment of fate of a pesticide in a water-sediment system.]

(iii) Schaefer, C.H., and E.F. Dupras, Jr. 1976. Factors affecting the stability of dimilin in water and the persistence of dimilin in field waters. J. Agr. Food Chem. 24:733-739. [This paper contains a small-scale technique for assessment of the fate of a pesticide in a water-sediment ecosystem.]

(2) The following references contain supplemental information for developing a protocol for conducting aquatic non-crop studies:

(i) Rice, C.P., H.C. Sikka, and R.S. Lynch. 1974. Persistence of dichlobenil in a farm pond. J. Agr. Food Chem. 22:533-534. [This paper contains a procedure for assessment of fate of a pesticide in a water-sediment system. Information on background interference and pesticide recovery from soil and water are presented.]

(ii) Schaefer, C.H., and E.F. Dupras, Jr. 1976. Factors affecting the stability of dimilin in water and the persistence of dimilin in field waters. J. Agr. Food Chem. 24:733-739. [This paper contains a small-scale technique for assessment of fate of a pesticide.]

§ 164-3 Dissipation studies for forestry uses.

(a) Purpose. Data from a dissipation residue study, conducted under actual use conditions, will indicate the extent and rate of pesticide residue dissipation and mobility in both aquatic and terrestrial environments which are encompassed in forestry sites.

(b) When required. Data from a field dissipation study for forestry uses must be submitted by each applicant for registration of an end-use product intended for forestry use, and by each applicant for registration of a manufacturing-use product which legally could be used to make such an end-use product.

Oxyfluorfen (GOAL) (707-145AA) (Acc No. 246781)

Rohm and Haas has submitted a recalculation of the EPA EXAMS assessment to predict the behavior of GOAL in an aquatic environment. Their assessment was performed by Ketron, Inc., Arlington, VA. for Rohm and Haas.

There was a second part to this assessment, that being the loading of a pesticide into a pond as determined by the Haith Model (Haith. 1980. J. Environ. Qual. 9:428-433).

This reviewer did not have time to set up and run the Haith model, however, he did perform a comparison between it and the EPA's Pesticide Runoff Simulator Model (SWRRB). Both models provided data for using atrazine in Watkinsville P-2 basin for 1974 and 1975. The results of predicted values were very close. Therefore, the SWRRB model was used to determine the pesticide loading for the EXAMS model.

Three different areas were used in the SWRRB model to determine a possible 'worse case' pesticide load: Watkinsville GA (P-2) (WATKINS2), YAZOO MS (YAZZ), and Riesel TX (SW-2) (RIESEL1). The applications were made for dates corresponding to the planting dates of corn and cotton and the label directions of GOAL. The applications were made 1 day before a heavy rainfall (>2 in/day). The following table is a presentation of the days of application and dates of 'worse case' runoff for the YAZZ basin. The pesticide runoff quantities for the YAZZ basin were ten times greater than for the WATKINS2 basin and 20 times greater than for the RIESEL1 basin. Therefore, the Yazoo basin data were used in the present evaluation.

YAZOO MS (YAZZ basin)

| Date of Application | | Worse runoff | | Quantity of pesticide runoff | Rainfall |
|---------------------|-----|--------------|-----|------------------------------|----------|
| yr | day | yr | day | (lb/A/day) | (inches) |
| 74 | 145 | 74 | 156 | .082 | 2.3 |
| 75 | 148 | 75 | 161 | .079 | 3.2 |

This data is based on a soil partition coefficient of 233 and a decay half life in sandy loam soil of 50 days. A full summary table for this run is provided. (A summary table for WATKINS2 is also provided).

When the soil partition coefficient was decreased to 25 as suggested by Rohm and Haas, the pesticide runoff quantity increased 3 fold for the same period. This supports the point that as the degree of soil binding increases, the amount of pesticide runoff decreases.

To enter EXAMS a non-point source load value must be determined. Because EXAMS is designed for continuous loading and not short-term bursts, a load value must be determined to give a total steady-state value.

With the 'worse case' daily runoff of .082 lb/A/day and given a 2 ha field and a 1 ha pond, the runoff would be 8.7×10^{-3} kg/hr for a 24 hr period. The total average annual runoff quantity was .282 lb/A. If this is spread out over the year the hourly runoff would be 7.1×10^{-5} kg/hr. Both of these values cannot be used as input values.

The two highest monthly pesticide outputs were .148 and .158 lb/A. If this monthly input were equal to the total steady state accumulation (mass), then the hourly rate of loading input for the pond can be determined by a ratio comparison to a known ratio of input to steady state accumulation. For this 2 ha field, the steady state accumulation would be .344 kg. The input value to achieve this steady-state value is 9.5×10^{-5} kg/hr. This is about 18 times greater than the original input value used by EPA (Burns, Athens ERL).

In addition to the source load, the accompanying table specifies the EXAMS parameters used by EPA and Rohm and Haas.

The results of the EXAMS runs are given in the accompanying tables along with the respective chemistries. The last table is a summary of all six runs (3 loadings vs 2 chemistries). From the summary table it can be seen that the changes in chemistry reduce the quantities in the environment of steady-state by 4 to 10 fold. However, the greatest effect is due to the loading input where a nearly 100 fold reduction in the loading factor reduces the environmental quantity by almost 3000 fold.

The three loadings can be stated as being the 'worse case', the 'normal case' for moderate rains, and the 'light case' for areas where rains are light or infrequent. It must also be remembered that this is for a pond scenario. Where a river or large lake exists there will be greater dilution and, therefore, less impact on non-target organisms which may be present.

Rohm and Haas's evaluation of the system is correct but a range of factors must be looked at and the results evaluated considering the variety of conditions that exist for the crop in question. The effect of GOAL on various nontarget organisms is deferred to Ecological Effects Branch.



Robert W. Holst, Ph.D.
Plant Physiologist
Environmental Fate Branch
Hazard Evaluation Division

Goal

EXAMS Parameters

| | <u>EPA</u> | <u>R&H</u> |
|-------------------------|---------------------|----------------|
| MWT | 361.7 | 361.7 |
| VAPR | 2.0E-6 | 2.0E-6 |
| SOL | 0.13 | 0.13 |
| KVO | 7.5E-2 | 7.5E-2 |
| KPS | 233 | 20 & 50 |
| HEN | 7.3E-6 | 7.3E-6 |
| KPB | 1800 | 300 |
| KDP | 7.38E-3 | .058 |
| Quant 1 | 1 | 1 |
| NPSLD | 5.25E-6 | 1.4E-8 |
| XSTUR | 10000 | 10000 |
| CHARL | 1.02 | 1.02 |
| DSP | 2.85E-5 (1.3E-4) | 1.6E-3 |
| Rflat | 32.0 | 32.0 |
| Depth of Active Sed. | 5 | 2.5 |
| PCTWA | 133 | 200 |
| NPSFL | 25.5 | |
| New NPSLD | 9.5E-5 | |

Comparison of Input Parameters and Results with EPA and R&H Chemistries

| Chemistry | Load (kg/hr) | Photolysis Half-life (days) | Water-borne Export Tl/2 (days) | Total System Load (kg/day) | Dissolved in water (mg/L) | Dissolved in Sediment (mg/L) | Dissolved in Pure water (mg/L) |
|-----------|-----------------|-----------------------------------|--------------------------------------|----------------------------------|---------------------------------|------------------------------------|--------------------------------------|
| EPA | 9.5E-5 | 237 | 190 | 2.28E-3 | 1.8E-3 | 1.8E-3 | 1.7E-3 |
| | 5.25E-6 | 237 | 190 | 1.26E-4 | 9.8E-5 | 1.0E-4 | 9.7E-5 |
| | 1.4E-8 | 237 | 190 | 3.36E-7 | 2.6E-7 | 2.7E-7 | 2.6E-7 |
| R&H | 9.5E-5 | 139 | 1039 | 3.51E-5 | 1.8E-4 | 1.8E-4 | 1.8E-4 |
| | 5.25E-6 | 139 | 1039 | 5.25E-6 | 2.7E-5 | 2.7E-5 | 2.7E-5 |
| | 1.4E-8 | 139 | 1039 | 1.40E-8 | 7.1E-8 | 7.2E-8 | 7.1E-8 |

INDEX TO MONTHLY SUMMARY FOR DEFINITION

SWRRB model run Yazoo MS
basin. Summary for
1974 and 1975.
K_d=233
Decay Half-Life=50 days

KD=233

P PRECIPITATION (IN)
Q MEASURED RUNOFF (IN)
R PREDICTED RUNOFF (IN)
S PREDICTED SURFACE Q (IN)
T PREDICTED BED YLD (TON/AC)
U EVAPOTRANSPIRATION (IN)
V DEEP PERCOLATION (IN)
W PESTICIDE LEACHED BELOW 1.0CM (LB/AC)
X PESTICIDE RUNOFF (LB/AC)

SWRRB - OXYFLUORFEN-YAZZ
SUMMARY OUTPUT

| | YEAR SEP | JAN OCT | FEB NOV | MAR DEC | ANNUAL APR TOTAL | MAY | JUN | JUL | AUG |
|---|-------------|------------|------------|------------|------------------------|--------|-------|-------|-------|
| | 1974 | | | | | | | | |
| 0 | P | 8.850 | 3.490 | 1.960 | 5.120 | 14.940 | 8.830 | 5.860 | 6.530 |
| 0 | 5.120 | 1.980 | 4.140 | 4.730 | 71.550 | | | | |
| 3 | Q | 0.885 | 0.349 | 0.196 | 0.512 | 1.494 | 0.883 | 0.586 | 0.653 |
| 3 | 0.512 | 0.198 | 0.414 | 0.473 | 7.155 | | | | |
| 2 | R | 5.499 | 1.153 | 0.209 | 2.734 | 9.923 | 5.660 | 1.380 | 2.172 |
| 2 | 1.705 | 0.333 | 0.632 | 1.148 | 32.547 | | | | |
| 2 | S | 5.486 | 1.144 | 0.208 | 2.733 | 9.913 | 5.651 | 1.380 | 2.172 |
| 2 | 1.705 | 0.333 | 0.632 | 1.148 | 32.505 | | | | |
| 4 | T | 0.922 | 0.168 | 0.105 | 1.646 | 3.089 | 3.402 | 0.358 | 0.124 |
| 4 | 0.642 | 0.041 | 0.100 | 0.295 | 10.892 | | | | |
| 0 | U | 2.309 | 2.153 | 1.585 | 1.872 | 3.823 | 4.481 | 7.689 | 3.210 |
| 0 | 3.983 | 2.217 | 2.249 | 2.153 | 37.724 | | | | |
| 4 | V | 0.723 | 0.604 | 0.223 | 0.204 | 0.671 | 0.570 | 0.133 | 0.064 |
| 4 | 0.044 | 0.046 | 0.039 | 0.014 | 3.335 | | | | |
| 0 | W | 0.000 | 0.000 | 0.000 | 0.000 | 0.006 | 0.011 | 0.018 | 0.010 |
| 0 | 0.007 | 0.002 | 0.003 | 0.002 | 0.058 | | | | |
| 7 | X | 0.000 | 0.000 | 0.000 | 0.000 | 0.085 | 0.148 | 0.013 | 0.007 |
| 7 | 0.007 | 0.001 | 0.001 | 0.001 | 0.263 | | | | |
| | 1975 | | | | | | | | |
| 0 | P | 3.680 | 5.780 | 8.970 | 5.920 | 9.020 | 5.790 | 4.950 | 5.160 |
| 0 | 1.510 | 5.230 | 4.330 | 2.320 | 62.660 | | | | |
| 6 | Q | 0.368 | 0.578 | 0.897 | 0.592 | 0.902 | 0.579 | 0.495 | 0.516 |
| 6 | 0.151 | 0.523 | 0.433 | 0.232 | 6.266 | | | | |
| 7 | R | 1.465 | 2.597 | 5.168 | 2.766 | 6.215 | 4.043 | 1.457 | 1.367 |
| 7 | 0.003 | 1.168 | 0.695 | 0.220 | 27.162 | | | | |
| 7 | S | 1.465 | 2.597 | 5.168 | 2.766 | 6.215 | 4.043 | 1.457 | 1.367 |
| 7 | 0.003 | 1.168 | 0.695 | 0.220 | 27.162 | | | | |
| 5 | T | 0.589 | 0.631 | 5.526 | 1.147 | 2.448 | 4.327 | 0.517 | 0.095 |
| 5 | 0.000 | 0.149 | 0.118 | 0.046 | 15.595 | | | | |
| 9 | U | 1.995 | 2.271 | 2.821 | 2.569 | 3.189 | 3.761 | 5.502 | 4.289 |
| 9 | 1.975 | 2.847 | 2.501 | 2.097 | 35.817 | | | | |
| 7 | V | 0.003 | 0.006 | 0.017 | 0.136 | 0.175 | 0.032 | 0.006 | 0.047 |
| 7 | 0.029 | 0.072 | 0.041 | 0.009 | 0.573 | | | | |
| 2 | W | 0.000 | 0.000 | 0.000 | 0.000 | 0.008 | 0.014 | 0.014 | 0.012 |
| 2 | 0.003 | 0.005 | 0.003 | 0.001 | 0.061 | | | | |
| 6 | X | 0.001 | 0.001 | 0.004 | 0.001 | 0.112 | 0.158 | 0.014 | 0.006 |
| 6 | 0.000 | 0.002 | 0.001 | 0.000 | 0.301 | | | | |

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SWRRB Model run
Yazoo MS
(YAZZ)

| | AVE | | | | | | | | |
|---|-------|-------|-------|-------|--------|--------|-------|-------|-------|
| | P | 6.265 | 4.635 | 5.465 | 5.520 | 11.980 | 7.310 | 5.405 | 5.845 |
| 5 | 3.315 | 3.605 | 4.235 | 3.525 | 67.105 | | | | |
| | Q | 0.627 | 0.464 | 0.547 | 0.552 | 1.198 | 0.731 | 0.541 | 0.585 |
| 5 | 0.332 | 0.361 | 0.424 | 0.353 | 6.711 | | | | |
| | R | 3.482 | 1.875 | 2.688 | 2.750 | 8.069 | 4.852 | 1.418 | 1.770 |
| 0 | 0.854 | 0.751 | 0.664 | 0.684 | 29.855 | | | | |
| | S | 3.476 | 1.870 | 2.688 | 2.749 | 8.064 | 4.847 | 1.418 | 1.770 |
| 0 | 0.854 | 0.751 | 0.664 | 0.684 | 29.833 | | | | |
| | T | 0.756 | 0.400 | 2.315 | 1.397 | 2.768 | 3.865 | 0.438 | 0.110 |
| 0 | 0.321 | 0.095 | 0.109 | 0.171 | 13.243 | | | | |
| | U | 2.152 | 2.212 | 2.203 | 2.220 | 3.506 | 4.121 | 6.596 | 3.750 |
| 0 | 2.979 | 2.532 | 2.375 | 2.125 | 30.771 | | | | |
| | V | 0.363 | 0.305 | 0.120 | 0.170 | 0.423 | 0.301 | 0.070 | 0.056 |
| 6 | 0.037 | 0.059 | 0.040 | 0.011 | 1.954 | | | | |
| | W | 0.000 | 0.000 | 0.000 | 0.000 | 0.007 | 0.013 | 0.016 | 0.011 |
| 1 | 0.005 | 0.004 | 0.003 | 0.002 | 0.059 | | | | |
| | X | 0.001 | 0.001 | 0.002 | 0.000 | 0.099 | 0.153 | 0.013 | 0.006 |
| 6 | 0.004 | 0.002 | 0.001 | 0.001 | 0.282 | | | | |

COMMOND USE DATA RUN UNLST ON UNP5000 01.5

P PRECIPITATION (IN)
 Q MEASURED RUNOFF (IN)
 R PREDICTED RUNOFF (IN)
 S PREDICTED SURFACE Q (IN)
 T PREDICTED SED YLD (TONX/AC)
 U EVAPOTRANSPIRATION (IN)
 V DEEP PERCOLATION (IN)
 W PESTICIDE LEACHED BELOW 1.0CM (LB/AC)
 X PESTICIDE RUNOFF (LB/AC)

SWRRB Model run
 Watkinsville GA
 (WATKINS2)
 Summary for 1974 -75
 K_d=233
 Decay Half-Life=50 days

SWRRB - OXYFLUORFEN-WATKINS2
 SUMMARY OUTPUT

| YEAR | JAN | FEB | MAR | ANNUAL | MAY | JUN | JUL | AUG |
|-------|-------|-------|-------|--------|-------|-------|-------|------|
| SEP | OCT | NOV | DEC | APR | | | | |
| | | | | TOTAL | | | | |
| 1974 | | | | | | | | |
| P | 2.700 | 4.110 | 1.920 | 2.600 | 5.420 | 5.290 | 4.150 | 5.78 |
| 1.850 | 0.360 | 1.160 | 4.920 | 40.260 | | | | |
| Q | 0.036 | 0.077 | 0.008 | 0.270 | 0.327 | 1.684 | 1.869 | 0.51 |
| 0.025 | 0.000 | 0.000 | 0.005 | 4.818 | | | | |
| R | 0.006 | 0.174 | 0.000 | 0.059 | 0.603 | 0.930 | 0.390 | 0.37 |
| 0.000 | 0.000 | 0.000 | 0.019 | 2.556 | | | | |
| S | 0.000 | 0.127 | 0.000 | 0.041 | 0.572 | 0.927 | 0.380 | 0.37 |
| 0.000 | 0.000 | 0.000 | 0.008 | 2.428 | | | | |
| T | 0.000 | 0.017 | 0.000 | 0.001 | 0.386 | 0.222 | 0.145 | 0.06 |
| 0.000 | 0.000 | 0.000 | 0.001 | 0.842 | | | | |
| U | 2.586 | 2.398 | 1.572 | 1.863 | 3.225 | 3.489 | 5.529 | 6.27 |
| 2.048 | 0.357 | 0.820 | 2.140 | 32.303 | | | | |
| V | 0.491 | 1.476 | 0.144 | 0.937 | 1.017 | 0.280 | 0.481 | 0.02 |
| 0.006 | 0.003 | 0.009 | 0.339 | 5.206 | | | | |
| W | 0.000 | 0.000 | 0.000 | 0.000 | 0.021 | 0.022 | 0.021 | 0.01 |
| 0.004 | 0.000 | 0.001 | 0.002 | 0.089 | | | | |
| X | 0.000 | 0.000 | 0.000 | 0.000 | 0.022 | 0.013 | 0.004 | 0.00 |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.041 | | | | |
| 1975 | | | | | | | | |
| P | 5.020 | 7.170 | 9.780 | 3.930 | 5.650 | 3.970 | 4.670 | 2.34 |
| 5.370 | 0.350 | 0.000 | 0.000 | 48.250 | | | | |
| Q | 0.063 | 0.388 | 1.984 | 0.696 | 0.384 | 1.710 | 1.298 | 0.07 |
| 0.463 | 0.000 | 0.000 | 0.000 | 7.061 | | | | |
| R | 0.171 | 1.838 | 4.293 | 0.684 | 0.400 | 0.902 | 0.016 | 0.00 |
| 0.233 | 0.000 | 0.000 | 0.000 | 8.536 | | | | |
| S | 0.101 | 1.748 | 4.214 | 0.625 | 0.356 | 0.876 | 0.016 | 0.00 |
| 0.233 | 0.000 | 0.000 | 0.000 | 8.169 | | | | |
| T | 0.014 | 0.169 | 1.379 | 0.056 | 0.196 | 0.382 | 0.004 | 0.00 |
| 0.032 | 0.000 | 0.000 | 0.000 | 2.230 | | | | |
| U | 2.893 | 2.553 | 2.996 | 2.105 | 3.112 | 3.572 | 6.009 | 2.17 |
| 2.824 | 0.779 | 0.302 | 0.242 | 29.561 | | | | |
| V | 2.305 | 2.531 | 2.381 | 1.719 | 1.504 | 0.861 | 0.016 | 0.01 |
| 0.040 | 0.135 | 0.000 | 0.000 | 11.506 | | | | |
| W | 0.002 | 0.001 | 0.001 | 0.000 | 0.008 | 0.035 | 0.024 | 0.00 |
| 0.010 | 0.000 | 0.000 | 0.000 | 0.090 | | | | |
| X | 0.000 | 0.001 | 0.002 | 0.000 | 0.000 | 0.022 | 0.000 | 0.00 |
| 0.001 | 0.000 | 0.000 | 0.000 | 0.027 | | | | |

SWRRB Model run
Watkinsville GA
(WATKINS2)

| | | | | | | | | |
|-------|-------|-------|-------|--------|-------|-------|-------|------|
| AVE | | | | | | | | |
| P | 3.860 | 5.640 | 5.850 | 3.265 | 5.535 | 4.630 | 4.410 | 4.06 |
| 3.610 | 0.355 | 0.580 | 2.460 | 44.255 | | | | |
| Q | 0.050 | 0.233 | 0.996 | 0.483 | 0.356 | 1.697 | 1.584 | 0.29 |
| 0.244 | 0.000 | 0.000 | 0.003 | 5.940 | | | | |
| R | 0.089 | 1.006 | 2.147 | 0.371 | 0.501 | 0.916 | 0.203 | 0.18 |
| 0.117 | 0.000 | 0.000 | 0.009 | 5.546 | | | | |
| S | 0.050 | 0.937 | 2.107 | 0.333 | 0.464 | 0.901 | 0.198 | 0.18 |
| 0.117 | 0.000 | 0.000 | 0.004 | 5.298 | | | | |
| T | 0.007 | 0.093 | 0.689 | 0.029 | 0.291 | 0.302 | 0.075 | 0.03 |
| 0.016 | 0.000 | 0.000 | 0.000 | 1.536 | | | | |
| U | 2.739 | 2.475 | 2.284 | 1.984 | 3.169 | 3.531 | 5.769 | 4.22 |
| 2.436 | 0.568 | 0.561 | 1.191 | 30.932 | | | | |
| V | 1.398 | 2.004 | 1.263 | 1.328 | 1.261 | 0.571 | 0.249 | 0.01 |
| 0.023 | 0.069 | 0.004 | 0.169 | 8.356 | | | | |
| W | 0.001 | 0.001 | 0.000 | 0.000 | 0.015 | 0.028 | 0.022 | 0.01 |
| 0.007 | 0.000 | 0.000 | 0.001 | 0.089 | | | | |
| X | 0.000 | 0.000 | 0.001 | 0.000 | 0.011 | 0.017 | 0.002 | 0.00 |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.034 | | | | |

Original Rohm and Haas chemistry data base used by Larry Burns, Athens ERL, to run the EXAMS model for the Oxyfluorfen Position Document 1,2,3. It is entitled here as 'EPA Chemistry Data Base' for use in the following tables.

COMPOUND CHARACTERISTICS FOR > OXYFLUORFEN

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND, AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 1.1. SH2 (NEUTRAL MOLECULE, SPECIES #1) INPUT DATA.

| | | | |
|---|--------------|-----------------|------------------|
| MWT= 361.7 | SOL = .1300 | VAPR= 2.000E-02 | HENRY= 7.322E-06 |
| KVO= 7.500E-02 | ESOL= .0 | EVPR= .0 | EHEN = .0 |
| KPS= 233.0 | KPB = 1800. | KOC = .0 | KOW = .0 |
| KAH1= .0 | EAH1= .0 | KNH1= .0 | ENH1= .0 |
| KAH2= .0 | EAH2= .0 | KNH2= .0 | ENH2= .0 |
| KAH3= .0 | EAH3= .0 | KNH3= .0 | ENH3= .0 |
| KBH1= .0 | EBH1= .0 | KDX1= .0 | EDX1= .0 |
| KBH2= .0 | EBH2= .0 | KDX2= .0 | EDX2= .0 |
| KBH3= .0 | EBH3= .0 | KDX3= .0 | EDX3= .0 |
| KBACW1= .0 | QW1= .0 | KBACS1= .0 | QTS1= .0 |
| KBACW2= .0 | QW2= .0 | KBACS2= .0 | QTS2= .0 |
| KBACW3= .0 | QW3= .0 | KBACS3= .0 | QTS3= .0 |
| KDP= 7.380E-03 | RFLAT= 32.00 | LAMAX= 0.0 | |
| QUANT1= 1.000 | QUANT2= .0 | QUANT3= .0 | |
| ABSORPTION SPECTRUM (ABS): .0 .0 .0 .0 .0 .0 .0 | | | |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |

NAME

SIMULATION BEGINNING FOR:

COMPOUND: OXYFLUORFEN

EPA Chemistry Data Base

ENVIRONMENT: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

WITH A LOAD OF (KG/HQ) > .9500020E-04

RUN COMPLETE.

EXAMS >

LIST 15

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 15. ANALYSIS OF STEADY-STATE FATE OF ORGANIC TOXICANT.

| PROCESS | MASS FLUX KG/DAY | % OF LOAD | HALF-LIFE* DAYS |
|------------------------------|---------------------|-----------|--------------------|
| HYDROLYSIS | .0 | 0.0 | --- |
| OXIDATION | .0 | 0.0 | --- |
| PHOTOLYSIS | 9.166E-04 | 40.20 | 237.3 |
| ALL CHEMICAL PROCESSES | 9.166E-04 | 40.20 | 237.3 |
| WATER COLUMN (BACTERIA) | .0 | 0.0 | --- |
| BOTTOM SEDIMENTS (BACTERIA) | .0 | 0.0 | --- |
| TOTAL BIOLYSIS | .0 | 0.0 | --- |
| VOLATILIZATION | 2.171E-04 | 9.52 | 1002. |
| WATER-BORNE EXPORT | 1.146E-03 | 50.27 | 189.8 |
| TRANSFORMATION AND TRANSPORT | 2.280E-03 | 100.00 | |
| TOTAL SYSTEM LOAD | 2.280E-03 | | |
| RESIDUAL ACCUMULATION RATE: | 5.588E-09 | 0.00 | |

* HALF-LIVES ARE ESTIMATES BASED ON A FIRST-ORDER RATE APPROXIMATION.

EXAMS >

LIST 17

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 17. EXPOSURE ANALYSIS SUMMARY.

EXPOSURE:

- A. MAXIMUM CONC. IN WATER COLUMN: 1.8E-03 MG/L DISSOLVED; 1.8E-03 TOT
MAX. CONC. IN BOTTOM SEDIMENT: 1.7E-03 MG/L DISSOLVED IN PORE WATER
- B. BIOSORPTION - MAX. CONCENTRATION - FLANKTON: 3.2 UG/G
BENTHOS: 3.1 UG/G
- C. MAXIMUM TOT. CONC. IN SEDIMENT DEPOSITS: .41 MG/KG (DRY WEIGHT)

FATE:

- A. TOTAL STEADY-STATE ACCUMULATION: .31 KG; 11.68% IN WATER COL.,
88.32% IN BOTTOM SEDIMENTS.
- B. TOTAL LOAD: 2.3E-03 KG/DAY - DISPOSITION: 40.20% VIA CHEMICAL
TRANSFORMATIONS, 0.0 % BIOTRANSFORMED, 9.52% VOLATILIZED,
50.27% EXPORTED VIA OTHER PATHWAYS.

PERSISTENCE:

- A. AT THE END OF A 192. DAY RECOVERY PERIOD, THE WATER COLUMN HAD
LOST 74.07% OF ITS INITIAL TOXICANT BURDEN; THE SEDIMENTS HAD
LOST 59.48% OF THEIR INITIAL BURDEN (61.18% REMOVAL OVERALL).
- B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 23. MONTHS.

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RUN

SIMULATION BEGINNING FOR:

EPA Chemistry Data Base

COMPOUND: OXYFLUORFEN

ENVIRONMENT: POND, AERL DEVELOPMENT PHASE TEST DEFINITION

WITH A LOAD OF (KG/HR) > .5250015E-05

RUN COMPLETE.

EXAMS >

LIST 17

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND, AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 17. EXPOSURE ANALYSIS SUMMARY.

EXPOSURE:

- A. MAXIMUM CONC. IN WATER COLUMN: $9.8E-05$ MG/L DISSOLVED, $1.0E-04$ TOT
MAX. CONC. IN BOTTOM SEDIMENT: $9.7E-05$ MG/L DISSOLVED IN PORE WATER
- B. BIOSORPTION - MAX. CONCENTRATION - PLANKTON: .18 UG/G
BENTHOS: .17 UG/G
- C. MAXIMUM TOT. CONC. IN SEDIMENT DEPOSITS: $2.3E-02$ MG/KG (DRY WEIGHT)

FATE:

- A. TOTAL STEADY-STATE ACCUMULATION: $1.7E-02$ KG; 11.68% IN WATER COL.,
88.32% IN BOTTOM SEDIMENTS.
- B. TOTAL LOAD: $1.3E-04$ KG/DAY - DISPOSITION: 40.20% VIA CHEMICAL
TRANSFORMATIONS, 0.0 % BIOTRANSFORMED, 9.52% VOLATILIZED,
50.27% EXPORTED VIA OTHER PATHWAYS.

PERSISTENCE:

- A. AT THE END OF A 192. DAY RECOVERY PERIOD, THE WATER COLUMN HAD
LOST 74.07% OF ITS INITIAL TOXICANT BURDEN; THE SEDIMENTS HAD
LOST 59.48% OF THEIR INITIAL BURDEN (61.18% REMOVAL OVERALL).
- B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 23. MONTHS.

EXAMS >

LIST 15

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND, AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 15. ANALYSIS OF STEADY-STATE FATE OF ORGANIC TOXICANT.

| PROCESS | MASS FLUX KG/DAY | % OF LOAD | HALF-LIFE* DAYS |
|------------------------------|---------------------|-----------|--------------------|
| HYDROLYSIS | .0 | 0.0 | --- |
| OXIDATION | .0 | 0.0 | --- |
| PHOTOLYSIS | $5.066E-05$ | 40.20 | 237.3 |
| ALL CHEMICAL PROCESSES | $5.066E-05$ | 40.20 | 237.3 |
| WATER COLUMN (BACTERIA) | .0 | 0.0 | --- |
| BOTTOM SEDIMENTS (BACTERIA) | .0 | 0.0 | --- |
| TOTAL BIOLYSIS | .0 | 0.0 | --- |
| VOLATILIZATION | $1.200E-05$ | 9.52 | 1002. |
| WATER-BORNE EXPORT | $6.334E-05$ | 50.27 | 189.8 |
| TRANSFORMATION AND TRANSPORT | $1.260E-04$ | 100.00 | |
| TOTAL SYSTEM LOAD | $1.260E-04$ | | |
| RESIDUAL ACCUMULATION RATE: | $2.619E-10$ | 0.00 | |

* HALF-LIVES ARE ESTIMATES BASED ON A FIRST-ORDER RATE APPROXIMATION.

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RUN

SIMULATION BEGINNING FOR:

COMPOUND: OXYFLUORFEN

EPA Chemistry Data Base

ENVIRONMENT: POND; AERL DEVELOPMENT PHASE TEST DEFINITION
WITH A LOAD OF (KG/HR) > .1400015E-07

RUN COMPLETE.

SYNOPSIS

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 15. ANALYSIS OF STEADY-STATE FATE OF ORGANIC TOXICANT.

| PROCESS | MASS FLUX KG/DAY | % OF LOAD | HALF-LIFE* DAYS |
|------------------------------|---------------------|-----------|--------------------|
| HYDROLYSIS | .0 | 0.0 | --- |
| OXIDATION | .0 | 0.0 | --- |
| PHOTOLYSIS | 1.351E-07 | 40.20 | 237.3 |
| ALL CHEMICAL PROCESSES | 1.351E-07 | 40.20 | 237.3 |
| WATER COLUMN (BACTERIA) | .0 | 0.0 | --- |
| BOTTOM SEDIMENTS (BACTERIA) | .0 | 0.0 | --- |
| TOTAL BIOLYSIS | .0 | 0.0 | --- |
| VOLATILIZATION | 3.200E-08 | 9.52 | 1002. |
| WATER-BORNE EXPORT | 1.689E-07 | 50.27 | 189.8 |
| TRANSFORMATION AND TRANSPORT | 3.360E-07 | 100.00 | |
| TOTAL SYSTEM LOAD | 3.360E-07 | | |
| RESIDUAL ACCUMULATION RATE: | 5.116E-13 | 0.00 | |

* HALF-LIVES ARE ESTIMATES BASED ON A FIRST-ORDER RATE APPROXIMATION.

LIST 17

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 17. EXPOSURE ANALYSIS SUMMARY.

EXPOSURE:

A. MAXIMUM CONC. IN WATER COLUMN: 2.6E-07 MG/L DISSOLVED; 2.7E-07 TOT
MAX. CONC. IN BOTTOM SEDIMENT: 2.6E-07 MG/L DISSOLVED IN PORE WATER

B. BIOSORPTION - MAX. CONCENTRATION - PLANKTON: 4.7E-04 UG/G
BENTHOS: 4.6E-04 UG/G

C. MAXIMUM TOT. CONC. IN SEDIMENT DEPOSITS: 6.1E-05 MG/KG (DRY WEIGHT)
FATE:

A. TOTAL STEADY-STATE ACCUMULATION: 4.6E-05 KG; 11.68% IN WATER COL.,
88.32% IN BOTTOM SEDIMENTS.

B. TOTAL LOAD: 3.4E-07 KG/DAY - DISPOSITION: 40.20% VIA CHEMICAL
TRANSFORMATIONS, 0.0 % BIOTRANSFORMED, 9.52% VOLATILIZED,
50.27% EXPORTED VIA OTHER PATHWAYS.

PERSISTENCE:

A. AT THE END OF A 192. DAY RECOVERY PERIOD, THE WATER COLUMN HAD
LOST 74.07% OF ITS INITIAL TOXICANT BURDEN; THE SEDIMENTS HAD
LOST 59.48% OF THEIR INITIAL BURDEN (61.18% REMOVAL OVERALL).

B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 23. MONTHS.

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New Rohm and Haas chemistry data base used by Ketron Inc. to run the EXAMS model for a reevaluation. It is entitled here as 'R&H Chemistry Data Base' for use in the following tables.

COMPOUND CHARACTERISTICS FOR > OXYFLUORFEN

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 1.1. SH2 (NEUTRAL MOLECULE, SPECIES #1) INPUT DATA.

| | | | |
|--|--------------|-----------------|------------------|
| MWT= 361.7 | SOL = .1300 | VAPR= 2.000E-02 | HENRY= 7.322E-06 |
| KVD= 7.500E-02 | ESOL= .0 | EVPR= .0 | EHEN = .0 |
| KPS= 20.00 | KPB = 300.0 | KDC = .0 | KDW = .0 |
| KAH1= .0 | EAH1= .0 | KNH1= .0 | ENH1= .0 |
| KAH2= .0 | EAH2= .0 | KNH2= .0 | ENH2= .0 |
| KAH3= .0 | EAH3= .0 | KNH3= .0 | ENH3= .0 |
| KBH1= .0 | EBH1= .0 | KDX1= .0 | EDX1= .0 |
| KBH2= .0 | EBH2= .0 | KDX2= .0 | EDX2= .0 |
| KBH3= .0 | EBH3= .0 | KDX3= .0 | EDX3= .0 |
| KBACW1= .0 | QW1= .0 | KBACS1= .0 | QTS1= .0 |
| KBACW2= .0 | QW2= .0 | KBACS2= .0 | QTS2= .0 |
| KBACW3= .0 | QW3= .0 | KBACS3= .0 | QTS3= .0 |
| KDP= 5.800E-02 | RFLAT= 32.00 | LAMAX= 0.0 | |
| QUANT1= 1.000 | QUANT2= .0 | QUANT3= .0 | |
| ABSORPTION SPECTRUM (ABS): .0 .0 .0 .0 .0 .0 | | | |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |
| .0 | .0 | .0 | .0 |

SIMULATION BEGINNING FOR:

R&H Chemistry Data Base

COMPOUND: OXYFLUORFEN

ENVIRONMENT: POND: AERL DEVELOPMENT PHASE TEST DEFINITION

WITH A LOAD OF (KG/HR) > .9500020E-04

NON-POINT-SOURCE LOADING EXCEEDED SOLUBILITY LIMIT IN ELEMENT 1.

LOAD HAS BEEN ADJUSTED.

RUN COMPLETE.

EXAMS >

LIST 15

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND: AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 15. ANALYSIS OF STEADY-STATE FATE OF ORGANIC TOXICANT.

| PROCESS | MASS FLUX KG/HR | % OF LOAD | HALF-LIFE* HOURS |
|------------------------------|--------------------|-----------|---------------------|
| HYDROLYSIS | .0 | 0.0 | --- |
| OXIDATION | .0 | 0.0 | --- |
| PHOTOLYSIS | 3.014E-05 | 85.88 | 139.5 |
| ALL CHEMICAL PROCESSES | 3.014E-05 | 85.88 | 139.5 |
| WATER COLUMN (BACTERIA) | .0 | 0.0 | --- |
| BOTTOM SEDIMENTS (BACTERIA) | .0 | 0.0 | --- |
| TOTAL BIOLYSIS | .0 | 0.0 | --- |
| VOLATILIZATION | 9.086E-07 | 2.59 | 4627. |
| WATER-BORNE EXPORT | 4.048E-06 | 11.53 | 1039. |
| TRANSFORMATION AND TRANSPORT | 3.510E-05 | 100.00 | |
| TOTAL SYSTEM LOAD | 3.510E-05 | | |
| RESIDUAL ACCUMULATION RATE: | 5.821E-11 | 0.00 | |

* HALF-LIVES ARE ESTIMATES BASED ON A FIRST-ORDER RATE APPROXIMATION.

EXAMS >

LIST 17

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND: AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 17. EXPOSURE ANALYSIS SUMMARY.

EXPOSURE:

A. MAXIMUM CONC. IN WATER COLUMN: 1.8E-04 MG/L DISSOLVED, 1.8E-04 TOT

MAX. CONC. IN BOTTOM SEDIMENT: 1.8E-04 MG/L DISSOLVED IN PORE WATER

B. BIOSORPTION - MAX. CONCENTRATION - PLANKTON: 5.4E-02 UG/G

BENTHOS: 5.3E-02 UG/G

C. MAXIMUM TOT. CONC. IN SEDIMENT DEPOSITS: 3.7E-03 MG/KG (DRY WEIGHT)

FATE:

A. TOTAL STEADY-STATE ACCUMULATION: 6.1E-03 KG; 59.18% IN WATER COL.,
40.82% IN BOTTOM SEDIMENTS.

B. TOTAL LOAD: 3.5E-05 KG/HOUR - DISPOSITION: 85.88% VIA CHEMICAL
TRANSFORMATIONS, 0.0% BIOTRANSFORMED, 2.59% VOLATILIZED,
11.53% EXPORTED VIA OTHER PATHWAYS.

PERSISTENCE:

A. AT THE END OF A 240. HOUR RECOVERY PERIOD, THE WATER COLUMN HAD
LOST 74.60% OF ITS INITIAL TOXICANT BURDEN; THE SEDIMENTS HAD
LOST 69.32% OF THEIR INITIAL BURDEN (72.45% REMOVAL OVERALL).

B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 27. DAYS.

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SIMULATION BEGINNING FOR:

COMPOUND: OXYFLUORFEN

R&H Chemistry Data Base

ENVIRONMENT: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

WITH A LOAD OF (KG/HR) > .5250015E-05

RUN COMPLETE.

EXAMS >

LIST 15

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 15. ANALYSIS OF STEADY-STATE FATE OF ORGANIC TOXICANT.

| PROCESS | MASS FLUX KG/HR | % OF LOAD | HALF-LIFE+ HOURS |
|------------------------------|--------------------|-----------|---------------------|
| HYDROLYSIS | .0 | 0.0 | --- |
| OXIDATION | .0 | 0.0 | --- |
| PHOTOLYSIS | 4.509E-06 | 85.88 | 139.5 |
| ALL CHEMICAL PROCESSES | 4.509E-06 | 85.88 | 139.5 |
| WATER COLUMN (BACTERIA) | .0 | 0.0 | --- |
| BOTTOM SEDIMENTS (BACTERIA) | .0 | 0.0 | --- |
| TOTAL BIOLYSIS | .0 | 0.0 | --- |
| VOLATILIZATION | 1.359E-07 | 2.59 | 4627. |
| WATER-BORNE EXPORT | 6.054E-07 | 11.53 | 1039. |
| TRANSFORMATION AND TRANSPORT | 5.250E-06 | 100.00 | |
| TOTAL SYSTEM LOAD | 5.250E-06 | | |
| RESIDUAL ACCUMULATION RATE: | 7.276E-12 | 0.00 | |

+ HALF-LIVES ARE ESTIMATES BASED ON A FIRST-ORDER RATE APPROXIMATION.

EXAMS >

LIST 17

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND; AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 17. EXPOSURE ANALYSIS SUMMARY.

EXPOSURE:

A. MAXIMUM CONC. IN WATER COLUMN: 2.7E-05 MG/L DISSOLVED, 2.7E-05 TOT
MAX. CONC. IN BOTTOM SEDIMENT: 2.7E-05 MG/L DISSOLVED IN PORE WATER

B. BIOSORPTION - MAX. CONCENTRATION - PLANKTON: 8.0E-03 UG/G
BENTHOS: 8.0E-03 UG/G

C. MAXIMUM TOT. CONC. IN SEDIMENT DEPOSITS: 5.5E-04 MG/KG (DRY WEIGHT)
FATE:

A. TOTAL STEADY-STATE ACCUMULATION: 9.1E-04 KG; 59.18% IN WATER COL.,
40.82% IN BOTTOM SEDIMENTS.

B. TOTAL LOAD: 5.3E-06 KG/HOUR - DISPOSITION: 85.88% VIA CHEMICAL
TRANSFORMATIONS, 0.0 % BIOTRANSFORMED, 2.59% VOLATILIZED,
11.53% EXPORTED VIA OTHER PATHWAYS.

PERSISTENCE:

A. AT THE END OF A 240. HOUR RECOVERY PERIOD, THE WATER COLUMN HAD
LOST 74.60% OF ITS INITIAL TOXICANT BURDEN; THE SEDIMENTS HAD
LOST 69.32% OF THEIR INITIAL BURDEN (72.45% REMOVAL OVERALL).

B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 27. DAYS.

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ROUT

SIMULATION BEGINNING FOR:

R&H Chemistry Data Base

COMPOUND: OXYFLUORFEN

ENVIRONMENT: POND, AERL DEVELOPMENT PHASE TEST DEFINITION

WITH A LOAD OF (KG/HR) > .1400015E-07

RUN COMPLETE.

EXAMS >

LIST 15

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND, AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 15. ANALYSIS OF STEADY-STATE FATE OF ORGANIC TOXICANT.

| PROCESS | MASS FLUX KG/HR | % OF LOAD | HALF-LIFE+ HOURS |
|------------------------------|--------------------|-----------|---------------------|
| HYDROLYSIS | .0 | 0.0 | --- |
| OXIDATION | .0 | 0.0 | --- |
| PHOTOLYSIS | 1.202E-08 | 85.88 | 139.5 |
| ALL CHEMICAL PROCESSES | 1.202E-08 | 85.88 | 139.5 |
| WATER COLUMN (BACTERIA) | .0 | 0.0 | --- |
| BOTTOM SEDIMENTS (BACTERIA) | .0 | 0.0 | --- |
| TOTAL BIOLYSIS | .0 | 0.0 | --- |
| VOLATILIZATION | 3.624E-10 | 2.59 | 4627. |
| WATER-BORNE EXPORT | 1.615E-09 | 11.53 | 1039. |
| TRANSFORMATION AND TRANSPORT | 1.400E-08 | 100.00 | |
| TOTAL SYSTEM LOAD | 1.400E-08 | | |
| RESIDUAL ACCUMULATION RATE: | 1.421E-14 | 0.00 | |

♦ HALF-LIVES ARE ESTIMATES BASED ON A FIRST-ORDER RATE APPROXIMATION.

EXAMS >

LIST 17

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS

CHEMICAL: OXYFLUORFEN

ECOSYSTEM: POND, AERL DEVELOPMENT PHASE TEST DEFINITION

TABLE 17. EXPOSURE ANALYSIS SUMMARY.

EXPOSURE:

- A. MAXIMUM CONC. IN WATER COLUMN: 7.1E-08 MG/L DISSOLVED, 7.2E-08 TOT
MAX. CONC. IN BOTTOM SEDIMENT: 7.1E-08 MG/L DISSOLVED IN PORE WATER
 - B. BIOSORPTION - MAX. CONCENTRATION - PLANKTON: 2.1E-05 UG/G
BENTHOS: 2.1E-05 UG/G
 - C. MAXIMUM TOT. CONC. IN SEDIMENT DEPOSITS: 1.5E-06 MG/KG (DRY WEIGHT)
- FATE:
- A. TOTAL STEADY-STATE ACCUMULATION: 2.4E-06 KG; 59.18% IN WATER COL.,
40.82% IN BOTTOM SEDIMENTS.
 - B. TOTAL LOAD: 1.4E-08 KG/HOUR - DISPOSITION: 85.88% VIA CHEMICAL
TRANSFORMATIONS, 0.0% BIOTRANSFORMED, 2.59% VOLATILIZED,
11.53% EXPORTED VIA OTHER PATHWAYS.

PERSISTENCE:

- A. AT THE END OF A 240. HOUR RECOVERY PERIOD, THE WATER COLUMN HAD
LOST 74.60% OF ITS INITIAL TOXICANT BURDEN; THE SEDIMENTS HAD
LOST 69.32% OF THEIR INITIAL BURDEN (72.45% REMOVAL OVERALL).
- B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 27. DAYS.